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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/702,136 | 11/05/2003 | Naoki Hanashima | 890050.447 | 6846 |

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EXAMINER

BLEVINS, JERRY M

ART UNIT PAPER NUMBER

2883

DATE MAILED: 04/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/702,136 | HANASHIMA ET AL. | |
| | Examiner | Art Unit | |
| | Jerry Martin Blevins | 2883 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-13, 16-18 and 20-22 is/are rejected.
- 7) ☒ Claim(s) 14, 15 and 19 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Specification

The disclosure is objected to because of the following informalities:

1. Element 40, Figures 1(a) and 1(b), is not disclosed in the specification. The examiner interprets this element to be a representation of the spot size at some arbitrary location within the gap of Figures 1(a) and 1(b).
2. Lines 24 and 25 of page 13 erroneously refer to Figures 2(a) and 2(b) as Figures 1(a) and 1(b).
3. Page 16, line 15, erroneously refers to substrate 11 as substrate 101.
4. Page 19, line 13, erroneously refers to element 103-2 as a lower cladding layer, while element 103-2 is previously described as an upper cladding layer.
5. Page 24, line 21, erroneously refers to the insertion angle of a Faraday rotator 31 as θ_g , while this angle is labeled in the drawings as θ_f .
6. Lines 16 and 17 of page 29 use the phrase, "either the right half or the right half," instead of the correct phrase, "either the right half or the left half."
7. Page 35, line 6, erroneously refers to waveguide 12 as waveguide 112.
8. Page 35, line 7, states that the embodiment illustrated in Figure 27 contains five circulators 120, while the actual drawing, Figure 27, shows only four circulators 120.

Appropriate correction is required.

Claim Objections

Claims 20 and 21 are objected to because of the following informalities:

Claims 20 and 21 claim "the optical functional element" without specifying which optical functional element is being claimed. Optical functioning elements of various limitations are claimed in Claims 10-19. The claim of "the" optical functioning element has indefinite limitations. Since no prior claim is specifically referenced, the examiner interprets Claim 20 as an independent claim, with no further limitations that are not directly or impliedly present in the claim itself. The examiner also interprets Claim 21 as an independent claim for the same reason.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claims 10 and 22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 10 and 22 claim an optical functional element which can be inserted into a groove of a waveguide-embedded optical circuit. The phrase "which can be" makes

Art Unit: 2883

the applicants' indicated claims unclear. The examiner is not sure whether the applicants simply claim any optical functional element which has the capability of being inserted into the groove of a waveguide-embedded optical circuit, or if the applicants claim an optical functional element that actually is inserted into the groove of the waveguide-embedded optical circuit. The examiner interprets these claims in the latter, namely, that the optical functional element actually is inserted into the groove of the waveguide-embedded optical circuit.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 10, and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Japanese Patent to Sasaki, et al, number JP02002182051A.

Regarding Claim 1, Sasaki teaches a waveguide embedded optical circuit (Figure 1, element 1) comprising:

- a waveguide (elements 21-28);
- a groove (element 3) formed across the waveguide; and
- two or more (specifically 8) embedded optical waveguide pairs which function as spot-size transformers (elements 61-68 corresponding to elements 21-28) whose members face each other across the groove.

Art Unit: 2883

Sasaki teaches that the photodetectors (elements 61-68) corresponding to the optical waveguides (elements 21-28) function as spot-size transformers (paragraph 54, page 6), while Figure 1 shows that elements 61-68 face the corresponding waveguide elements 21-28 from across the groove.

Regarding Claims 10 and 22, Sasaki also teaches an optical functional element (element 4) which can be, and is, inserted into the groove of the arrayed waveguide-embedded optical circuit with the above limitations.

3. Claim 20 is rejected under 35 U.S.C. 102(b) as being anticipated by Iwatsuka, US Patent Number 6,130,778.

Iwatsuka teaches an optical functional element (Figure 1) comprising:

- a magneto-optic functional element (element 5, specifically a Faraday rotator);

- first and second birefringent plates (elements 1 and 2) formed alternately on one surface of the magneto-optic functional element; and

- third and fourth birefringent plates (elements 3 and 4) formed alternately on the other surface of the magneto-optic functional element.

4. Claim 21 is rejected under 35 U.S.C. 102(b) as being anticipated by Ohta, US Patent number 5151915.

Ohta teaches an optical functional element (Figure 2) comprising:

- a magneto-optic functional element (element 15)

Art Unit: 2883

first birefringent plates (plate-like birefringent crystal, element 11) formed on one surface of the magneto-optic functional element; and
second birefringent plates (plate-like birefringent crystal, element 12) formed on the other side of the magneto-optic functional element.

Any intentional formation of birefringent plates on the surface of a magneto-optic functional element would be formed at some predetermined interval.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 2-6 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sasaki in view of Alphonse, US Patent number 6,363,188.

Regarding Claims 2 -5, Sasaki teaches the arrayed waveguide-embedded optical circuit in accordance with claim 1 but does not teach the further limitations placed on the spot-size transformers. However, Alphonse teaches a spot-size transformer (Figure 1) which comprises a first optical waveguide (element 140) comprising a first core (element 110) and a first cladding (element 120) and a second optical waveguide (element 160) comprising a second core (element 120) as an extension of the first cladding and a second cladding (element 130). Alphonse also teaches that the spot-

size transformer further comprises a transition waveguide (element 150) positioned between the first optical waveguide and the second optical waveguide that is constituted so that the width of the first core becomes gradually narrower as it goes toward the second optical waveguide. Alphonse also teaches that the first cladding substantially covers the whole surface of the first core and that the center of the first core and the center of the second core are aligned substantially on the same axis (Figure 1). It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the limitations of the spot-size converter of Alphonse in the waveguide-embedded optical circuit of Sasaki. The motivation would have been to widen the beam entering the gap region so as to reduce diffraction related loss. See lines 41-53 of Column 1 of Alphonse.

Regarding Claims 6 and 9, Sasaki in view of Alphonse teaches all of the limitations of claim 5. Sasaki also teaches the further limitations that the groove is formed at an angle (Figure 1, element 32) to a plane perpendicular to the axis of the light propagating through the spot-size transformer and that an optical filter (element 4) is inserted in the groove. The above justification for obviousness for Claims 2-5 also holds for Claims 6 and 9.

6. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sasaki in view of Alphonse, further in view of Iwatsuka.

Sasaki in view of Alphonse teaches the wave-guide embedded optical circuit in accordance with claim 6 and further teaches a filter inserted in the groove at an angle to

Art Unit: 2883

a plane perpendicular to the axis of the light propagating through the spot-size transformer (Sasaki, Figure 1 and Alphonse, Figure 1). Sasaki in view of Alphonse does not teach an optical isolator element. However, Iwatsuka teaches an optical isolator element (Figure 1) which could be inserted into a gap in a waveguide-embedded optical circuit. It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the filter of Sasaki in view of Alphonse with the optical isolator element of Iwatsuka. The motivation would have been to prevent reflection of light backwards across the gap.

7. Claims 11-13, 16, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sasaki in view Iwatsuka.

Regarding Claims 11 and 13, Sasaki teaches the optical functional element (element 4) in accordance with claim 10 but does not teach the further limitations placed on the optical functional element. However Iwatsuka teaches an optical functional element (Figure 1) comprising a magneto-optic functional element (element 5), first and second birefringent plates (elements 1 and 2) formed and arranged alternately on one surface of the magneto-optic functional element, and third and fourth birefringent plates (elements 3 and 4) formed and arranged alternately on the other surface of the magneto-optic functional element. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the magneto-optic functional element taught by Iwatsuka in the teaching of Sasaki. The motivation would have been to allow efficient passage of light across the gap between the pairs of optical waveguides.

Regarding Claim 12, Sasaki in view of Iwatsuka teaches all the limitations of claim 11. The magneto-optic functioning element of Iwatsuka also contains boundaries between the first and second birefringent plates and between the third and fourth birefringent plates that would coincide substantially with the direction of arrangement of the pairs of embedded optical waveguides if inserted into the groove of Sasaki. The above justification for obviousness for Claims 11 and 13 also holds for Claim 12.

Regarding Claim 16, Sasaki in view of Iwatsuka teach the optical element in accordance with claim 13. The arrangement and location of the birefringent elements taught by Iwatsuka are such that when the optical functional element is inserted in the groove, the beam spot of the light propagating through a predetermined pair of embedded optical waveguides is projected onto the first and third birefringent plates and the beam spot of the light propagating through another pair of embedded optical waveguides is projected onto the second and fourth birefringent plates. The above justification for obviousness for Claims 11 and 13 also holds for Claim 16.

Regarding Claim 17, Sasaki in view of Iwatsuka teaches the optical functional element in accordance with claim 16. Although Sasaki in view of Iwatsuka does not specifically teach the exact axis angles, Iwatsuka does teach that the optical axis of the first birefringent material and that of the second birefringent material intersect orthogonally, that the optical axis of the third birefringent material and that of the fourth birefringent material intersect orthogonally, and that the optical axis of the first birefringent material and that of the third birefringent material make an angle of 45 degrees with respect to each other. (See Column 14, lines 32-40). These relationships

between the various axes are identical to the relationships of the axes listed in Claim 17. Since the specific angles in Claim 17 are set to any predetermined reference axis, the axis relationships set forth by Iwatsuka read on the claim. The above justification for obviousness for Claims 11 and 13 also holds for Claim 17.

8: Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sasaki in view of Ohta.

Sasaki teaches the optical functional element in accordance with claim 10 but does not teach the further limitations. Ohta teaches an optical functional element (Figure 2) comprising a magneto-optic functional element (element 15), first birefringent plates (element 11) formed on one surface of the magneto-optic functional element, and second birefringent plates (element 12) formed on the other surface of the magneto-optic functional element. Any intentional formation of the birefringent plates on the surface of the magneto-optic functional element would be formed at some predetermined interval. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the optical functioning element of Ohta in the teaching of Sasaki. The motivation would have been to allow efficient passage of light across the gap between the pairs of optical waveguides.

Allowable Subject Matter

Claims 14, 15, and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding Claims 14 and 15, the prior art, as referenced above, teaches an optical functional element with first and second birefringent plates arranged on one side of a magneto-optic functional element and third and fourth birefringent plates arranged on the other side of the magneto-optic functional element. However, the prior art, either alone or in combination, does not disclose nor render obvious the teaching that the arrangement of the birefringent plates is in a checker pattern.

Regarding Claim 19, the prior art, as referenced above, teaches an optical functional element comprising a magneto-optic functional element with first birefringent plates formed on one surface and second birefringent plates formed on the other surface. However, the prior art, either alone or in combination, does not disclose nor render obvious the teaching that the plates do not substantially face each other across the magneto-optic functional element.

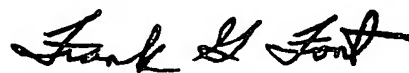
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jerry Martin Blevins whose telephone number is 571-272-8581. The examiner can normally be reached Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G. Font can be reached at 571-272-2415. The fax number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JMB



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